

Appl. No. : 10/657,440
Filed : September 8, 2003

AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows. Insertions are shown underlined while deletions are struck through.

1 (currently amended): A liquid injector for injecting a contrast medium into a subject whose fluoroscopic image is to be captured by an imaging diagnostic apparatus, comprising:

a liquid injection mechanism for injecting said contrast medium into said subject; pattern storing means for registering data of a variable pattern in which an injection rate of the contrast medium for keeping an image contrast of the fluoroscopic image within a predetermined range varies with time, said pattern storing means storing registered data in which the variable pattern is comprised of a linear decrease of the injection rate of the contrast medium from the start of injection to a set point of time, and from said point of time a constant or a linear increase of the injection rate of the contrast medium; and

rate controlling means for varying an operating speed of said liquid injection mechanism with time according to said variable pattern.

2 (original): A liquid injector according to claim 1, wherein said pattern storing means comprises means for registering the data of the variable pattern in order to maintain a state in which the image contrast of the fluoroscopic image that is produced by said contrast medium approximates an optimum level.

3 (original): A liquid injector according to claim 1, further comprising:

total amount entering means for accepting entered data of a total amount of the contrast medium to be injected into the subject;

said rate controlling means comprising means for increasing or reducing said injection rate in elapsed times according to said variable pattern depending on said total amount of the contrast medium to be injected into the subject.

4 (original): A liquid injector according to claim 3, further comprising:

data entering means for accepting entered data of the body weight of the subject; and

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total calculating means for increasing or reducing said total amount of the contrast medium to be injected into the subject in proportion to the body weight whose data has been entered by said data entering means.

5 (original): A liquid injector according to claim 3, further comprising:

coefficient storing means for registering data of predetermined coefficients assigned to respective regions to be imaged of the subject;

data entering means for accepting entered data of a region to be imaged of the subject;

coefficient reading means for reading the data of one of the coefficients from said coefficient storing means depending on the region to be imaged of the subject whose data has been entered by said data entering means; and

total calculating means for correcting said total amount of the contrast medium to be injected into the subject by multiplying said total amount by the coefficient whose data has been read by said coefficient reading means.

6 (currently amended): A liquid injector according to claim 3, wherein said

~~contract~~contrast medium is available in a plurality of types having different concentrations of an effective component contained therein, further comprising:

concentration storing means for registering data of the different concentrations in the types of said ~~contract~~contrast medium;

data entering means for accepting entered data of a type of the contrast medium;

concentration reading means for reading data of the concentration from said concentration storing means depending on the type of the contrast medium whose data has been entered by said data entering means; and

total calculating means for increasing or reducing said total amount of the contrast medium to be injected into the subject in inverse proportion to said concentration whose data has been read by said concentration reading means.

7 (currently amended): A liquid injector according to claim 3, wherein said

~~contract~~contrast medium is available in a plurality of types having different concentrations of an effective component contained therein, further comprising:

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concentration storing means for registering data of the different concentrations in the types of said ~~contract~~contrast medium;

coefficient storing means for registering data of predetermined coefficients assigned to respective regions to be imaged of the subject;

data entering means for accepting entered data of at least the body weight of the subject, a region to be imaged of the subject, and one of the types of the contrast medium;

concentration reading means for reading data of the concentration from said concentration storing means depending on the type of the contrast medium whose data has been entered by said data entering means;

coefficient reading means for reading the data of one of the coefficients from said coefficient storing means depending on the region to be imaged of the subject whose data has been entered by said data entering means; and

total calculating means for correcting said total amount of the contrast medium to be injected into the subject, which has been increased or reduced in proportion to said body weight and in inverse proportion to said concentration, by multiplying said total amount by said one of the coefficients.

8 (currently amended): A method of injecting a liquid with a liquid injector according to claim 1, comprising the step of:

(i) providing a liquid injector comprising:

a liquid injection mechanism for injecting a contrast medium into a subject,

pattern storing means for registering data of a variable pattern in which an injection rate of the contrast medium for keeping an image contrast of the fluoroscopic image within a predetermined range varies with time, said pattern storing means storing registered data in which the variable pattern is comprised of a linear decrease of the injection rate of the contrast medium from the start of injection to a set point of time, and from said point of time a constant or a linear increase of the injection rate of the contrast medium, and

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rate controlling means for varying an operating speed of said liquid injection mechanism with time according to said variable pattern, and

(ii) injecting the contrast medium into the subject using the liquid injector varying at an injection rate of said contrast medium varied with time according to said variable pattern.

9 (original): A method according to claim 8, further comprising the steps of accepting entered data of a total amount of the contrast medium to be injected into the subject; and

increasing or reducing said injection rate in elapsed times according to said variable pattern depending on said total amount of the contrast medium to be injected into the subject.

10 (currently amended): A method according to claim 9, wherein said ~~contrast~~ contrast medium is available in a plurality of types having different concentrations of an effective component contained therein, further comprising the steps of:

registering data of the different concentrations in the types of said ~~contrast~~ contrast medium;

registering data of predetermined coefficients assigned to respective regions to be imaged of the subject;

accepting entered data of at least the body weight of the subject, a region to be imaged of the subject, and one of the types of the contrast medium;

reading data of the concentration depending on the type of the contrast medium whose data has been entered;

reading the data of one of the coefficients depending on the region to be imaged of the subject whose data has been entered; and

correcting said total amount of the contrast medium to be injected into the subject, which has been increased or reduced in proportion to said body weight and in inverse proportion to said concentration, by multiplying said total amount by said one of the coefficients.

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11 (currently amended): A computer unit for controlling operation of a liquid injection mechanism of a liquid injector for injecting a contrast medium into a subject whose fluoroscopic image is to be captured by an imaging diagnostic apparatus, comprising:

pattern storing means for registering data of a variable pattern in which an injection rate of the contrast medium varies with time, said pattern storing means storing registered data in which the variable pattern is comprised of a linear decrease of the injection rate of the contrast medium from the start of injection to a set point of time, and from said point of time a constant or a linear increase of the injection rate of the contrast medium; and

rate controlling means for varying an operating speed of said liquid injection mechanism with time according to said variable pattern.

12 (original): A computer unit according to claim 11, further comprising:

total amount entering means for accepting entered data of a total amount of the contrast medium to be injected into the subject;

said rate controlling means comprising means for increasing or reducing said injection rate in elapsed times according to said variable pattern depending on said total amount of the contrast medium to be injected into the subject.

13 (currently amended): A computer unit according to claim 12, wherein said ~~contrast~~contrast medium is available in a plurality of types having different concentrations of an effective component contained therein, further comprising:

concentration storing means for registering data of the different concentrations in the types of said ~~contrast~~contrast medium;

coefficient storing means for registering data of predetermined coefficients assigned to respective regions to be imaged of the subject;

data entering means for accepting entered data of at least the body weight of the subject, a region to be imaged of the subject, and one of the types of the contrast medium;

concentration reading means for reading data of the concentration from said concentration storing means depending on the type of the contrast medium whose data has been entered by said data entering means;

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coefficient reading means for reading the data of one of the coefficients from said coefficient storing means depending on the region to be imaged of the subject whose data has been entered by said data entering means; and

total calculating means for correcting said total amount of the contrast medium to be injected into the subject, which has been increased or reduced in proportion to said body weight and in inverse proportion to said concentration, by multiplying said total amount by said one of the coefficients.

14 (original): A computer program for enabling a computer unit according to claim 11 to carry out a process of varying an operating speed of said liquid injection mechanism with time according to said variable pattern.

15 (original): A computer program according to claim 14 for enabling said computer to carry out a process comprising the steps of:

accepting entered data of a total amount of the contrast medium to be injected into the subject; and

increasing or reducing said injection rate in elapsed times according to said variable pattern depending on said total amount of the contrast medium to be injected into the subject.

16 (currently amended): A computer program according to claim 15, wherein said ~~eontrae~~~~contrast~~ medium is available in a plurality of types having different concentrations of an effective component contained therein, said computer program enabling said computer to carry out a process comprising the steps of:

registering data of the different concentrations in the types of said ~~eontrae~~~~contrast~~ medium;

registering data of predetermined coefficients assigned to respective regions to be imaged of the subject;

accepting entered data of at least the body weight of the subject, a region to be imaged of the subject, and one of the types of the contrast medium;

reading data of the concentration depending on the type of the contrast medium whose data has been entered;

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reading the data of one of the coefficients depending on the region to be imaged of the subject whose data has been entered; and

correcting said total amount of the contrast medium to be injected into the subject, which has been increased or reduced in proportion to said body weight and in inverse proportion to said concentration, by multiplying said total amount by said one of the coefficients.

17 (original): An information storage medium storing therein a computer program according to claim 14, which is to be read by a computer unit.